

APPLICATION
FOR
UNITED STATES LETTERS PATENT
ENTITLED:

GEOGRAPHICAL COMPARISON SYSTEM AND METHOD

TO WHOM IT MAY CONCERN:

BE IT KNOWN THAT (1) VALE SUNDARAVEL and (2) BENJAMIN J. PAUL, of (1) Framingham, Middlesex County, Massachusetts and (2) Winchester, Middlesex County, Massachusetts, invented certain new and useful improvements entitled as set forth above of which the following is a specification:

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2
3 GEOGRAPHICAL COMPARISON SYSTEM AND METHOD

4
5 CLAIM OF PRIORITY

6 This application claims priority to U.S.S.N. 60/207,738,
7 entitled "Venue Encryption Apparatus and Method", and filed on
8 May 24, 2000, naming Vale Sundaravel and Benjamin J. Paul as
9 inventors, the contents of which are herein incorporated by
10 reference in their entirety, and this application also claims
11 priority to U.S.S.N. 60/213,013, entitled "Discrete Location
12 Encoder", and filed on June 21, 2000, naming Vale Sundaravel and
13 Benjamin J. Paul as inventors, the contents of which are also
14 herein incorporated by reference in their entirety.

15
16 CROSS-REFERENCE TO RELATED APPLICATIONS

17 This patent application is co-pending with a related patent
18 application entitled "Location Encoder", having the same
19 inventors as this patent application and filed concurrently
20 herewith, the contents of which are incorporated herein by
21 reference in their entirety.

22
23 BACKGROUND

24 (1) Field

1 The methods and systems relate generally to encryption
2 systems and methods, and more particularly to encrypting
3 geographic or location data.

4 (2) Description of the Prior Art

5 The increase in internet popularity among the general public
6 is responsible for a tremendous focus on electronic commerce, or
7 e-commerce. As consumers are aware, as commerce evolves, so does
8 advertising. Certain businesses have consequently developed
9 techniques to profile internet users, wherein the user profiles
10 can thereafter be sold to internet advertisers. Some of these
11 profiles are generated using information voluntarily provided by
12 internet users, while other profiles are generated using
13 "cookies" or other tracking techniques that are impervious to
14 the internet user. Such unknowing use of involuntary information
15 has spawned great debate regarding privacy issues. As the number
16 of electronic devices increases, it is expected that the privacy
17 concerns will similarly increase.

18 One such concern for privacy involves a pending regulation
19 that requires cellular phones to be equipped with self-locating
20 information for emergency calls to 911. Such location
21 information is standard in the non-mobile phone industry, thereby
22 allowing law enforcement or other emergency personnel to quickly
23 locate an emergency caller. Although the intent of the
24 regulation for cellular phones is admirable in striving for
25 increased emergency personnel response to cellular phone users,
26 there are concerns that the location information provided in the

1 location identification technology can be intercepted and
2 utilized as profiling information in the form of geographic
3 tracking, for example. As the numbers of cellular and other
4 wireless and network-connected devices increases, and the uses
5 for such devices similarly expands, this privacy concern may
6 achieve greater weight.

7 There is currently not an efficient apparatus or method to
8 convert geographic data to provide generalized location
9 information without divulging specific location information.

10 What is needed is a system and method that protects specific
11 location data while providing generic geographic information.

12 SUMMARY

13
14 The systems and methods herein convert geographic
15 information into an encrypted token that can be compared to other
16 such encrypted tokens to allow general geographic information
17 comparison, while protecting location specific information and
18 hence privacy. In one embodiment, the result of the geographic
19 comparison is a distance measure. The geographic location can
20 include latitude/longitude data, street address data, destination
21 data, directional data (north, south, east, west, north-east,
22 south-west, etc.), zone information, or other traditional, useful
23 location data. In one embodiment, the data can be input to a
24 Universal Location Descriptor (ULD) translator or generator that
25 translates the location data into a ULD or "geocode", that in
26 some embodiments, can be a binary code. The geocode can be

1 compared to other geocodes to provide geographic comparison. The
2 geocode can also be encrypted into a token that can also be
3 compared to other such encrypted tokens. In some embodiments,
4 the tokens can allow generalized geographic commonalities to be
5 identified without indicating specific location information. In
6 one embodiment, services such as gasoline stations, restaurants,
7 grocery stores, etc., can subscribe to a provider by contributing
8 geographic information for token generation. The provider can
9 generate and maintain a token database(s) for many types of
10 services. Consumers can similarly provide tokenized geographic
11 information to the provider, whereupon the provider can perform
12 the token comparison to inform the consumer of the services of
13 interest in the consumer's general area. In an embodiment,
14 neither the provider, nor the services, can decipher the exact
15 location of the consumer, while the consumer is provided with the
16 desired service information in the respective consumer geographic
17 area. Such data exchange can therefore occur without infringing
18 on the consumer's privacy. In one embodiment, the token
19 comparison process can provide a probabilistic measure that can
20 be further filtered using a specified threshold value.

21 In one embodiment, the systems and methods respond to a
22 request for geographically relevant data, wherein geographically
23 relevant data includes data that can be restricted or otherwise
24 categorized according to some geographic criteria that can
25 include a radius, a distance, a direction, etc. For example

1 geographically relevant data can include gasoline stations within
2 a ten mile radius of a given location.

3 Other objects and advantages of the will become more obvious
4 hereinafter in the specification and drawings.

5 6 BRIEF DESCRIPTION OF THE DRAWINGS

7 FIG. 1 is an architectural system diagram of the venue token
8 generation process;

9 FIG. 2 is a diagram of a system that can be utilized to
10 generate the venue tokens of FIG. 1;

11 FIG. 3 is a diagram of venue token processing that can occur
12 after the generation and collection process indicated by FIG. 1;
13 and,

14 FIG. 4 presents an illustrative system utilizing venue
15 tokens in processing a request for services.

16 17 DESCRIPTION

18 To provide an overall understanding, certain illustrative
19 embodiments will now be described; however, it will be understood
20 by one of ordinary skill in the art that the systems and methods
21 described herein can be adapted and modified to provide systems
22 and methods for other suitable applications and that other
23 additions and modifications can be made without departing from
24 the scope of the methods and systems described herein.

25 Referring now to FIG. 1, there is a block diagram 10 of a
26 system as related to the generation of venue tokens, wherein

1 venue tokens can generated from a variety of sources that can be
2 referenced herein collectively as providers 12. A provider 12
3 can be understood as an entity with a geographic location that
4 can be referred to or described either individually (e.g.,
5 ``McDonald's'') or collectively (e.g., ``Restaurant'', ``Fast
6 Food'', ``Hamburgers''). In some embodiments, such as an
7 embodiment illustrated by FIG. 1, providers 12 can be suppliers
8 of services of goods, whether such goods are at wholesale,
9 consumer, or other levels. As used herein, geographic
10 information can be understood to include information that can
11 relate to a location or reference to a reference or coordinate
12 system, using a reference system within the coordinate system,
13 and includes but is not limited to one or more of addresses,
14 parcel numbers, wards, plot numbers, zip codes, area codes,
15 latitude, and/or longitude, etc.

16 In the illustrated embodiment of FIG. 1, the providers 12
17 are service stations 14, restaurants 16, pharmacies 18, network
18 service providers 20, and other similar providers, for which the
19 aforementioned providers merely serve as a representative and not
20 an exhaustive example. For the purposes of the methods and
21 systems disclosed herein, a provider 12 can also be understood as
22 an entity that can be associated with geographic information as
23 defined herein.

24 In the embodiment of FIG. 1, the providers 12 can be
25 equipped with a ``vencryptor'' 22 that translates the specific
26 provider's geographic information into a corresponding venue

1 token 24, hereinafter referred to as a vencrypt token. An
2 alternate embodiment can include a configuration wherein a single
3 vencryptor 22 collects geographic inputs from the multiple
4 providers 12. The vencryptor 22 can therefore be incorporated
5 locally and be in local communication with a particular provider
6 12 or set of providers in a wired or wireless networked
7 environment, or the vencryptor 22 can be accessed over a non-
8 local network in wired or wireless configuration. In the FIG. 1
9 embodiment, provider vencrypt tokens 24 are stored in a
10 database that can be located at a central processing location;
11 however, an alternate storage mechanism can be utilized, and the
12 methods and systems herein are not limited by such storage
13 mechanism or medium, or the location of such database or storage
14 mechanism. For example, only select vencrypt tokens 24 may be
15 saved in one embodiment, or multiple databases may be utilized to
16 save the vencrypt tokens 24. These multiple databases can be
17 organized and further subdivided using one or more of many
18 different categories, including for example, geographic location,
19 provider-type, etc., with such examples provided for illustration
20 rather than limitation. Those with ordinary skill in the art
21 will recognize that such a database, and other databases referred
22 to herein, can be a memory having one or more physical or logical
23 partitions and/or segments, and can optionally and additionally
24 utilize one or more of well-known database packages including
25 MySQL, SQL, Oracle, Informix, etc., with such examples provided
26 merely for illustration and not limitation.

1 In an embodiment, vencyptor tokens related to a particular
2 provider can be stored locally at the provider 12, and
3 transmitted upon receiving a request that can utilize the token.

4 FIG. 1 also depicts an array of anticipated consumers 26.
5 As shown by FIG. 1, the consumers 26 can be identified by
6 communication devices typically utilized by consumers. The
7 illustrated consumers 26 are intended to exemplify modes of
8 accessing networked data, and such access methods can be wired or
9 wireless, through an Internet Service Provider, T1 link, or other
10 such networking or communications scheme. The network can be the
11 internet, a cellular phone network, or other communications
12 system, wherein such networks can utilize protocols such as
13 Internet Protocol (IP) or Wireless Application Protocol (WAP),
14 although such examples are provided merely for illustration and
15 not limitation. Examples of such consumers 26 can include an
16 electronic device 28 such as a personal computer, a cellular
17 phone 30, a personal digital assistant 32, or a cellular carrier
18 34. Just as with the providers 12, the list of consumers 26
19 provided herein is merely representative of a list of devices
20 owned or operated by individuals or entities seeking information.

21 For the purposes of the discussion herein, consumers 26 can
22 therefore be understood as an entity or individual having an
23 association with geographic information as defined herein. Those
24 with ordinary skill in the art will recognize that a consumer 26
25 can be a provider 12, and vice-versa, for the illustrated systems
26 and methods.

1 In the FIG. 1 embodiment, consumer devices connect to a
2 vencryptor 22 that accepts geographic information from the
3 respective consumer 26 to generate a vencrypted token for the
4 consumer 36. In the embodiment illustrated in FIG. 1, wherein
5 consumers 26 can be equipped with dedicated vencryptors 22, such
6 a configuration can allow integration of the various consumers 26
7 and vencryptor devices 22 into a single module. In an alternate
8 embodiment, multiple consumers 26 can access a single vencryptor
9 22, that can be, for example, incorporated into a particular
10 network, cellular carrier service, etc. The vencryptor 22 can
11 intercept the geographic information from the consumers 26, and
12 process the respective consumer geographic information to form
13 vencrypted tokens 36. Vencryptors 22 can hence be accessed
14 through a local or non-local network, using wired or wireless
15 communications links and protocols as necessary. Vencryptor
16 tokens for consumers 26 can also be stored in a database 36 that
17 can be centrally located or stored locally and transmitted with a
18 request from a consumer.

19 Referring now to FIG. 2, there is a detailed diagram of the
20 vencryptor 22 from FIG. 1. The illustrated vencryptor 22
21 includes a Universal Location Descriptor (ULD) translator 40, and
22 a Token Generator 42. Those with ordinary skill in the art will
23 recognize that the illustrated vencryptor 22 of FIG. 2 is merely
24 provided for discussion purposes and is not intended as a
25 limitation of the functionality or structure of a vencryptor 22.

26 As shown by FIGs. 1 and 2, the vencryptor 22 can accept

1 geographic information that can be latitude/longitude 44, address
2 information 46 that includes street, state, and/or zip code,
3 directional information 48, destination address information 50,
4 or another type of geographical information as described herein
5 previously or as otherwise understood by one of ordinary skill in
6 the art. Such information can be input to the illustrated ULD
7 generator 40 that translates the geographic information into a
8 geographic code, or geocode. In the FIG. 2 system, a geocode can
9 be represented as a binary number such that different positions
10 in the binary number relate to different geographical precisions,
11 although those with ordinary skill in the art will recognize that
12 the geocode can be represented in other formats. In an
13 embodiment according to FIG. 2, the binary geocode can be sixty-
14 four bits, however other geocode precisions can be used.

15 For the illustrated systems and methods that utilize a
16 binary geocode wherein different positions in the binary number
17 relate to different geographical precisions, two geocodes can be
18 compared to provide a geographic comparison without revealing
19 geographic information. In one embodiment, the comparison can be
20 performed using a bitwise operation such as an exclusive OR (XOR)
21 operation, although such an embodiment is provided for
22 illustration and not limitation. The output of the comparison
23 operation can be a distance measure.

24 For the illustrated system, a geocode can be input to the
25 illustrated Token Generator 42 that encrypts the geocode to form
26 a vencrypted token 24, 36. The illustrated Token Generator 42

1 can encrypt or otherwise mask the geocode according to location
2 information 52 that can also be provided to the Token Generator
3 42, although such information may not be utilized in all
4 embodiments. For example, geographic information 44, 46, 48, 50
5 with regard to a consumer can be very specific, allowing a high
6 degree of certainty in creating the geocode; however, a consumer
7 26 may provide a request that may not require such a high
8 precision. In such instances, the additional location
9 information 52 can indicate that the more precise information in
10 the geocode can be encrypted, masked, eliminated, etc. Those
11 with ordinary skill in the art can therefore recognize that the
12 methods and systems can allow encryption by masking or otherwise
13 eliminating accuracy or precision of the geocode, thereby
14 protecting the privacy of a location to which the geocode
15 corresponds.

16 For example, one system and method that can represent the
17 illustrated ULD generator 40 to generate a binary geocode
18 includes the system and method disclosed in a co-pending, related
19 application entitled "Location Encoder," the contents of which
20 are herein incorporated by reference, wherein the geocode is a
21 binary representation of geographical information. In an
22 embodiment using this representation, geographical information
23 can be represented to an accuracy of sixteen one-hundredths
24 square-inches, although such accuracy may not be required of all
25 applications. Accordingly, a consumer request can be a request
26 for precision on the order of square miles or tens of miles. In

1 such an embodiment, the sixteen one-hundredth square-inch
2 precision, and perhaps other levels of precision, can be masked,
3 encrypted, etc., to a precision level based on the request.

4 The Token Generator 42 can also provide a generic encryption
5 scheme known to those of ordinary skill in the art, to
6 additionally and optionally encrypt the geocode. In some
7 embodiments, the illustrated Token Generator 42 can provide
8 multiple forms of encryption.

9 As FIG. 2 indicates, in some embodiments, geographic
10 information can be transferred directly to the Token Generator
11 42, thereby bypassing the ULD translator 40.

12 Referring now to FIG. 3, there is an illustrative system 60
13 wherein the vencrypt tokens can be processed. As FIG. 3
14 indicates, an illustrated Venue Pattern Matching Device (VPMD) 62
15 can process a received consumer vencrypt token 36 against the
16 provider vencrypt tokens 24. The illustrated VPMD 62 can
17 extract the geographic information from the provider and consumer
18 tokens 64, 66, correlate the geographic information 68, and
19 identify 70 those consumer and provider associations that can be
20 within a specified geographic threshold 72. In the FIG. 3
21 system, the geographic threshold 72 can be fixed, can vary
22 according to a system manager or other administrator, or can vary
23 depending upon consumer specified information 74a. In the FIG. 3
24 system, the correlation performed can be, for example, in
25 response to a request received by the consumer, e.g.,

1 "restaurants" within a given proximity of the present location of
2 the consumer.

3 In an embodiment according to FIG. 3, consumer-specific
4 information 74b, for example, home address, telephone number,
5 demographic data, work address, etc., can be input to the VPMD 62
6 in performing the correlation function. Consumer-specific
7 information 74b can increase or decrease the geographic
8 correlations that might otherwise occur without such information
9 74b. Additionally, as FIG. 3 indicates, consumer-specific
10 information 74a in specifying a geographic threshold 72 can also
11 increase or decrease the geographic correlations that might
12 otherwise occur without such additional and/or optional
13 information.

14 The illustrated VPMD 62 can provide as output a confidence
15 measure, illustrated in FIG. 3 as a probability 76, that
16 represents a comparison between a consumer token 36 and a
17 provider token 24 relative to the aforementioned processing. In
18 some embodiments, the probability 76 can be based on the degree
19 of accuracy to which the geographic information can be known.
20 For example, if the geographic information includes less precise
21 information such as a zip code or area code, without further
22 information, the geocodes and hence the vencrypted tokens 24, 36,
23 for the consumer and/or providers can be associated with varying
24 degrees of uncertainty relative to the request, depending upon
25 the desired precision of the request. In an example, a certainty
26 of determining a restaurant (e.g., provider) within five miles of

1 the consumer, when the consumer's (and/or provider's) location
2 can only be identified to a precision on the order of 10 square
3 miles, can be different from the certainty when the consumer's
4 (and/or provider's) location can be identified to a precision of
5 1 square mile.

6 As a further illustration, consider an example where the
7 geographical information associated with a request includes a zip
8 code. In one embodiment, a geocode can be computed using the
9 centroid of the zip code. Without further information from the
10 consumer, an uncertainty can be associated with the exact
11 location of the consumer within the zip code. In one embodiment,
12 more precise aspects of the geocode can be masked based on the
13 uncertainty.

14 In the illustrated systems, the vencryptd token comparison
15 can be understood to be a correlation, although other comparison
16 operations can be used. In one embodiment, a system manager or
17 other administrator can establish a probability threshold 78 that
18 can filter the Venue Probability Distribution 76 to provide
19 outputs that compare to the threshold 78. In an embodiment, the
20 probability threshold 78 can be constant, or the probability
21 threshold 78 can be variable. For the FIG. 3 systems, provider
22 vencryptd tokens 24 within the specified probability threshold
23 78 can be returned as an output of the FIG. 3 system to the
24 network 80.

25 Referring now to FIG. 4, there is an illustrative system 100
26 that utilizes the features of FIGs. 1-3 for processing a service

1 request from a consumer that is, in FIG. 4, a cellular phone 30.

2 A cellular phone user can enter a request for information with
3 associated geographic information, to the cellular phone 30, and
4 that information can be transmitted, transferred, etc., to a
5 vencryptor 22. The geographic information can be entered by the
6 user, or additionally and optionally, can be provided by a device
7 otherwise incorporated into the cellular phone 30 or integrated
8 to operate with the cellular phone 30. In the FIG. 4 system 100,
9 the vencryptor 22 is a separate device from the cellular phone
10 30, although the two devices can be integrated in other
11 embodiments. The vencryptor 22, for example, can reside on a
12 server that is separate from the cellular phone 30, or the
13 vencryptor 22 can be a processor and/or set of instructions that
14 is incorporated into the cellular phone 30. The vencryptor 22
15 can convert the geographical information to a vencrypted token,
16 and transmit the vencrypted consumer token to the VPMD 62. In
17 the FIG. 4 system 100, the vencryptor can parse the request
18 information from the geographical information, and can transmit
19 the request to the Provider Vencrypted Database 102, although
20 those with ordinary skill in the art will recognize that a
21 separate device can perform the parsing. The illustrated
22 Provider Vencrypted Database 102 can maintain separate databases
23 according to request type, although a single database can also be
24 utilized. Those with ordinary skill in the art will recognize
25 that the systems and methods herein are not limited to the
26 format, arrangement, or type of database that can be represented

1 as the Provider Vencrypted Database 102. For example, the
2 illustrated Provider Encrypted Databases 102 can include
3 vencrypted tokens for registered providers in that service
4 industry, wherein the vencrypted tokens were generated using the
5 process described in FIGs. 1 and 2. In the FIG. 4 system 100,
6 the Provider Vencrypted Database tokens can be stored with the
7 respective unencrypted geographic information and unencrypted
8 identity information.

9 Depending upon the consumer request, the Provider Vencrypted
10 Database 102 can provide the VPMD 62 with the corresponding
11 provider vencrypted tokens and the associated unencrypted
12 geographic and identity information. For example, if the
13 consumer request is for restaurants, the illustrated Provider
14 Encrypted Database 102 can provide the VPMD 62 with provider
15 vencrypted tokens relating to the restaurant database. The
16 illustrated VPMD 62 can then compare and/or correlate the
17 vencrypted consumer token with the provider vencrypted tokens,
18 and utilize the probability threshold 78 to identify those
19 provider tokens having a probability of a geographic location
20 within a certain threshold of the consumer token. The
21 illustrated VPMD 62 can extract the unencrypted geographical and
22 identity information associated with such identified provider
23 tokens, and transmit such information to the cellular phone 30 as
24 a list of highly correlated provider identities, responsive to
25 the initial request. In the example, such provider identities
26 can correspond to restaurants, for example, in the geographic

1 area provided by the cellular phone 30. The cellular phone 30 is
2 therefore provided with geographically relevant data without
3 divulging specific geographic information to the VPMD 62 or the
4 Provider Vencrypted Database 102. The VPMD 62 need not decrypt
5 the consumer information, but can merely compare the encrypted
6 tokens.

7 The FIG. 4 system 100 is merely one illustration, and
8 certain features can be eliminated or combined to achieve the
9 same effect. For example, with respect to FIG. 4, the vencryptor
10 22 can communicate the vencrypted consumer token to the Provider
11 Vencrypted Database 102. The Provider Vencrypted Database 102
12 can perform some pre-filtering of the provider vencrypted tokens
13 before transmission to the VPMD 62 (e.g., provide tokens based on
14 limited geographic area as opposed to all tokens in a given
15 request database). Similarly, the request information may not
16 pass through the vencryptor 22, and may proceed directly to the
17 Provider Vencrypted Database 102.

18 One advantage of the methods and systems over the prior art
19 is that the vencrypted tokens protect the privacy of the consumer
20 while providing geographically relevant data.

21 What has thus been described are systems and methods to
22 create venue tokens that provide generalized geographic
23 information while preserving location specific data. In one
24 embodiment, a Universal Location Descriptor (ULD) translator
25 converts location data into a geocode that in one embodiment is a
26 binary code. Location information can include a street address,

1 zip code, directional information, destination, velocity
2 information, latitude and/or longitude, etc. The geocode can
3 then be encrypted to generate a token. Relative geographic
4 similarities can be identified by comparing geographic
5 information from the tokens, thereby allowing similarly situated
6 individuals and/or organizations, service providers, etc., to be
7 identified without disclosing specific location identities of
8 those parties seeking such privacy. The comparison of token
9 geographic information can provide a probabilistic output that,
10 in one embodiment, can be customized using an application-
11 dependent threshold, to generate only those outputs satisfying a
12 specified probability measure.

13 The techniques described herein are not limited to a
14 particular hardware or software configuration, and may find
15 applicability in many computing or processing environments. The
16 techniques can be implemented in hardware or software, or a
17 combination of hardware and software. The techniques can be
18 implemented in one or more computer programs executing on one or
19 more programmable computers that include a processor, a storage
20 medium readable by the processor (including volatile and non-
21 volatile memory and/or storage elements), one or more input
22 devices, and one or more output devices.

23 The computer program(s) is preferably implemented in one or
24 more high level procedural or object-oriented programming
25 languages to communicate with a computer system; however, the

1 program(s) can be implemented in assembly or machine language, if
2 desired. The language can be compiled or interpreted.

3 The computer program(s) can be preferably stored on a
4 storage medium or device (e.g., CD-ROM, hard disk, or magnetic
5 disk) readable by a general or special purpose programmable
6 computer for configuring and operating the computer when the
7 storage medium or device is read by the computer to perform the
8 procedures described herein. The system can also be considered
9 to be implemented as a computer-readable storage medium,
10 configured with a computer program, where the storage medium so
11 configured causes a computer to operate in a specific and
12 predefined manner.

13 Although the methods and systems have been described
14 relative to a specific embodiment thereof, they are not so
15 limited. Obviously many modifications and variations may become
16 apparent in light of the above teachings. For example, the
17 functionality represented by the different functional blocks
18 presented in the illustrative figures can be combined. Any
19 useful geographical information can be utilized, or information
20 that can be translated into geographical information (e.g., zip
21 code). The vencryptors can be centrally located, incorporated
22 into individual devices, or a system can use a combination of
23 such configurations. The vencryptor devices can additionally be
24 accessed via a wired or wireless communications network,
25 including the internet, using one or more of many well-known
26 communications protocols. Although a list of providers was

1 listed including service stations, restaurants, pharmacies,
2 network service providers, etc., an item, information, etc., that
3 has associated geographic information can qualify as a provider.

4 Many additional changes in the details, materials, and
5 arrangement of parts, herein described and illustrated, can be
6 made by those skilled in the art. Accordingly, it will be
7 understood that the following claims are not to be limited to the
8 embodiments disclosed herein, can include practices otherwise
9 than specifically described, and are to be interpreted as broadly
10 as allowed under the law.